

KRANNER HEART RESEARCH INSTITUTE USES PI-6200 TO MONITOR LIVE TISSUES

One of the most unique applications on record for the PI-6200 Portable Instrumentation Tape Recorder is at the Kranner Heart Research Institute in Indianapolis, Indiana. Using highly sophisticated techniques, researchers at the Institute are able to keep heart tissue alive indefinitely for detailed analysis of cellular functions.

This analysis (known as electrophysiology) is a highly instrumented study of the electrical behaviour of a single heart cell in a controlled environment. One commonly used technique of this specialty involves measuring the potential gradient across the membrane that composes the cell wall. To accomplish this, a

glass micro-electrode is used, consisting of glass tubing drawn to a tip diameter of less than $\frac{1}{2}$ microinch (if you can see the tip under a microscope, it's no good). The tube is filled with a conductive saline solution.

This electrode is then used to puncture the cell wall and sample the potential within the cell. When an externally generated electrical stimulus is applied to the cell, a characteristic waveform called an action potential, is generated by the cell. From the waveshape of this generated potential, much can be deduced about the concentration of metabolites within the cell and in the fluid about it, and the ability of the cell to perform its



Close-up showing insertion of glass electrodes into living heart tissue

normal function. This waveform is usually recorded by camera from the monitoring oscilloscope or, when subsequent computer analysis is desired, by a Precision Instrument 6200 Magnetic Tape Recorder which is played back into an A/D converter.

Another commonly used procedure is the measurement of oxygen uptake of tissue samples. For this determination a device called a microflow respirometer is used to provide a constant, slowly replenished source of oxygen saturated tyrode solution to a tiny piece of tissue. The oxygen concentration of the effluent is measured to determine the amount of oxygen used by the cell. Since the amount of oxygen used in our tissue sample is about 1 microliter S.T.P. per hour and since it is often desirable to perform additional analysis on the effluent, a non-destructive, highly sensitive means of measuring oxygen concentration is needed. For this reason, a Clark Polarographic electrode capable of detecting uptakes of .01 microliters/hr. without significantly altering composition of the effluent solution is generally used.

Simultaneous measurement of tension or of the action potentials previously described are often made and it



PI-6200 records action potential of living cell during electrophysiology experiment

INSIDE TRACK



Konrad Schoebel

With this first issue of INTERFACE, it is my hope that a stronger channel of communication will now be established between Precision Instrument Company and its customers, employees and friends who have shown a continued interest in our operations.

For some time we have felt that a publication of this sort was needed to keep our friends both within and outside the Company up to date on our activities. INTERFACE will be published at regular intervals, with the primary purpose of familiarizing you with the products, operations and personnel of PI and advising of major happenings in our organization.

Our company is now in its ninth year of operation, and I cannot help but look back every now and then to the early days of PI when we were a one-product organization with a rather limited and highly specialized market. Today, through an ambitious diversification program, we are actively engaged in the fields of instrumen-

KRANNERT RESEARCH (Cont. from Page 1)

is not unusual that a single respirometer contain three or four separate transducer systems in addition to the oxygen electrode.

The adaptive mechanism of living beings ensures that no subject can remain unchanged by its environment even for relatively short periods of time. The primal law "adapt or die" produces a corollary related to bio-scientific measurement "get it now or forget it." There are no retakes. For this reason a highly dependable method of recording is required. The PI-6200 Portable Instrumentation tape recorder assures the necessary results and, because of its 3-speed capability of recording and reproducing in both directions, it provides an excellent means of pinpointing required data for later detailed analysis.

For further information Ref. Art. #1

tation, video and digital tape recording, and our market is widespread. PI equipment is now found in a variety of unique applications, as diverse as the market in which we are competing, and one of the features of INTERFACE will be regular articles describing some of the applications where PI recorders are in operation. To provide a broader knowledge of our products, technical articles on specific equipment will be included, as well as examples of possible applications of a particular recorder, along with suggestions for obtaining the maximum performance from PI equipment. On a less technical vein, news releases of Company activities and personnel will be a means of further acquainting you with PI.

This, then, is what we hope to accomplish with INTERFACE. If you have an opportunity, we would like to receive your comments on our first publication and any suggestions you might have that will enable us to establish a more effective means of communication.

Konrad W. Schoebel

NEWS BITS

A NEW SUBSIDIARY, PRECISION INSTRUMENT (U.K.), LTD. has just begun operations. The new company, initiated to increase sales and service capabilities in the European market, will be located near London, England and headed by former PI Export Manager, Bill McLellan. In his new position as Vice President and Managing Director for Precision Instrument (U.K.), Ltd., McLellan will report to Marketing Vice President, Bill Bennett, and be responsible for overseeing the sales and service organization. Mr. Verne Seale-Finch has been named Sales Manager reporting to McLellan.

According to Company President, Konrad W. Schoebel, "This new subsidiary is a natural outgrowth of PI's continued leadership in overseas marketing. It should provide us with the required facilities to take full advantage of this rich market for instrumentation recording systems."

For further information Ref. Art. #2



WILLIAM MCLELLAN
A New Home

EDITORIAL STAFF

Editor Don Larsen
Assoc. Editor Ann Kasparek
Personnel Gloria Spanier
Marketing Paul Jansen
Manufacturing Byron Carr
Engineering Al Wilson

**IMPORTANT
NOTICE**

**W. G. WEESE, PI CANADA LIMITED,
RECEIVED A \$3,300 AWARD . . .**

given by the Canadian National Defense Ministry for his idea on a low-cost radar application for airfields. This idea involves using a secondary radar net to send signals "up and over" the main radar antenna instead of setting up additional antennae to guide aircraft during bad weather as originally proposed. These signals trigger transponders in landing aircraft. The transponder sends back signals which are more distinct than the echoes of the main radar signals. Weese's prize represents the most money ever given for a suggestion by the government's incentive award board.

THE APPOINTMENT OF MR. B. W. ROBERTSON as Manager of Quality Assurance provides additional leadership for one of PI's most vital departments. Robertson, a graduate of California Aero-Technical Institute, has a background of supervisory positions in quality assurance at General Micro-Electronics, Inc., Advanced Technology, Division of American Sanitary Corp. and ITEK Laboratories.



B. W. Robertson

MR. NORMAN L. WETTER, a graduate of Rensselaer Polytechnic Institute, has joined PI as Supervisor of Manufacturing Engineering. A background as Group Supervisor of Fabrication Manufacturing Engineering for the Ampex Corp. is included in his 14 years of varied experience in manufacturing engineering and production control.

MR. NORMAN SMITH has been promoted to Company Comptroller with responsibility for the financial functions relating to manufacturing costs, public pricing and financial analysis. Smith will spend a significant portion of his time assisting other departments in establishing an integrated control system and cost/pricing procedures for the Corporation.

Replacing Mr. Smith as Manager of General Accounting will be Charles B. Cameron. Cameron was most recently employed as Senior Accountant for the Advanced Technology Division of American Standard. His background includes positions in accounting, sales and management at Peterson & Company and Prestige Tools.



Norman Smith

For quickest response to inquiries on articles appearing in **INTERFACE**, please check to see that your zip code number is included.

TRANSIENTS



TWO PI RECORDERS ADD A PERSONAL TOUCH TO REGIONAL SALES MEETINGS

Rather than bringing the salesmen to the company for important sales meetings, PI is taking the company to the salesmen. During the recent introduction of the PI-1200 Incremental Digital Recorder, two other PI products were used which allowed a complete factory presentation to be made throughout the country to all PI salesmen and rep organizations.

The initial sales meeting (held for the Western group) in Palo Alto, California, consisted of two parts. The morning session was a slide film presentation on basic computer principles. The narration accompanying the film was recorded on 2 channels of a PI-6200 Instrumentation Recorder. Channel Two carried the audio portion of the slide film to the amplifier system, and Channel One carried an 800 cycle pulse which worked into a small detector. The detector caused the slide projector to automatically change slides in sequence with the narration. During the afternoon session, presentations were held by PI personnel on the new product. This entire session, including a preview of the WESCON Convention exhibit was picked up by a closed circuit television system and recorded simultaneously on a PI-3V Video Recorder.

(Continued Col. 1, Page 6)



Ed Webb checks out buffering system with PI-1200 recorder



More space . . . more personnel . . . means better publications



PI's UNICON System under laboratory test

PLAY - BACK

UNICON PAPER GETS STANDING OVATION AT ISA...

Three years of company-sponsored research effort found its reward last month at the ISA Conference in New York. A paper presented by PI Research Director, Dr. Carl Becker, on the UNICON Coherent Light Recording System captured the imagination and enthusiasm of a record crowd and was followed by a standing ovation, more than an hour of questions and a second standing ovation. The system, developed and fostered solely by Precision Instrument Company uses lasers to record broadband data up to 100 KHz for instantaneous playback.

PI GETS TWO CONTRACTS FOR OVER \$1 MILLION...

Two major government contracts from the Army and Navy Departments were received by Precision Instrument this October. The Army contract for around \$825,000 will cover the manufacture and delivery of 350 recorder/reproducers of a special configuration. The Navy contract, from the Navy Electronics System Command is in the amount of \$350,000 for the manufacture and delivery of 50 ten-channel audio recorder and monitoring units for monitoring voice transmission between pilot and GCA operator.



Research Director, Dr. Carl Becker presents UNICON Paper at Fall Joint Computer Conference

A ROUND-UP OF KEY EVENTS AT PI DURING THE PAST TWO MONTHS

NEW ADAPTER UPS RECORDING RATE 400% ...

A special buffering system, developed by PI Applications Engineer Edwin Webb, has added a whole new dimension to the PI-1200 Incremental Recorder Line. The buffer operates as a temporary storage device, working in conjunction with the Slew Rate mode of the the PI-1200. The technique provides for reading speeds of 1200 characters per second at 556 BPI and 2000 characters per second at 800 BPI. Incremental reading speeds previously did not exceed 500 steps per second.

CHAPMAN RECEIVES \$1000 BONUS ...

Virtue may be its own reward, but a little hard cash now and then comes in handy. Just ask Los Angeles Sales Representative Gerry Chapman, who received a \$1000 check from Company President Konrad Schoebel for a \$1 million year at PI. Congratulations, Gerry.

PI PUBLICATIONS DEPT. TAKES ON A NEW LOOK ...

Bigger and better things in the way of product documentation are in the offing at PI. An expanded Publications Department, headed by veteran writer Jim Jones, will serve the dual purpose of Instruction Manual and Technical Proposal preparation.



*A happy Gerry Chapman receiving \$1000 check from
Company President Konrad Schoebel*



*Sales and Engineering Departments work out the details on equipment for two recently acquired government contracts. From l to r:
Jim Jones, Ray Williams, Joe Shane, Al Wilson and Jim Black*

RECORDERS ADD A PERSONAL TOUCH (Cont. from Page 3)

The end result was that the complete sales meeting, as it took place in Palo Alto, could then be made available throughout the country. Three duplicate presentations were shipped to the Midwest, East, and Southern Sales Regions shortly after the live meeting. The regional managers, in turn, acted as MC's and presented the entire program to their personnel. The cost savings on travel alone easily justified this approach to the presentation, and the novelty of the session has gone a long way toward generating sales enthusiasm for the new product line.

For further information Ref. Art. #3

MOSQUITOES FIND LOVE "A TENDER TRAP"

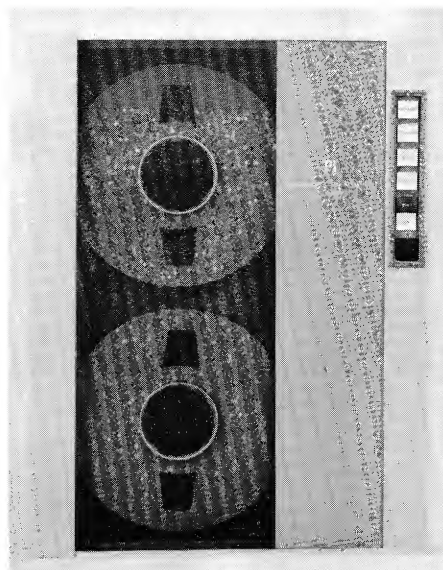
Alluring smells and the rustle of soft gossamer have long been sure traps for the vulnerable male — mosquito. But during this age of cosmetics and computers, ribbons and recorders, it's hard for a guy to tell the "real" thing. Canadian scientists predict that within a few years, they will have perfected plots to hit mosquitoes "below their belts."

These scientists hope to use the female mosquitoes' smell or the sound of their little wings to lure hordes of male mosquitos into traps. Once in the traps, a chemical will be employed to render the males sexually sterile. On a large scale, one can see that the effect on the mosquito birth-rate would be pretty drastic.

Those mosquitoes attracted by the females' smell can relax for a while as plans for capturing and reproducing the enticing odor are still "on the drawing board." But mosquitoes preferring the seductive hum of female mosquito wings had best abandon thoughts of love. Through the use of a tape recorder and a sensitive instrument called a micro-manipulator, scientist Pater Belton of Belleville, Ontario has been able to duplicate that sound so irresistible to male mosquitoes. Tomorrow the bee . . . and after that???

ON LINE WITH PI

PI ANNOUNCES NEW READ/ WRITE INCREMENTAL RECORDER WITH 200, 556 AND 800 BPI DENSITIES



PI-1200 Incremental Digital Recorder

The new PI-1200 Incremental Digital Recorder introduced at WESCON on August 25, represents a major breakthrough in the digital recording field. Designed to sell for \$6000, the PI-1200 features a High Speed Rate that will read and write in forward or reverse at 37.5 ips — stopping on a record gap, a Slew Rate that will record and reproduce at 2 or 4 ips — stopping on a character and an Asynchronous Rate of 300 steps per second. In the Read Mode the PI-1200

handles 200 and 556 BPI. In the Write Mode, it will handle 200, 556 and 800 BPI.

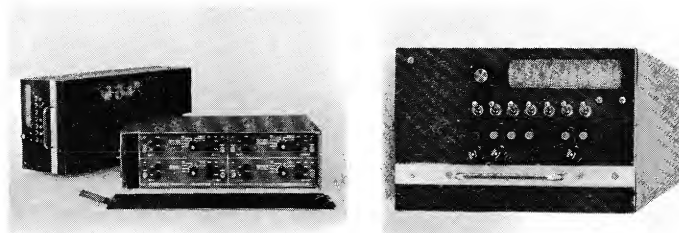
For further information Ref. Art. #4

NEW RADAR INTERFACE SYSTEM FOR BROADBAND RECORDERS

In order to record and reproduce radar information, a recorder must be able to record a continuous broadband video spectrum, antenna position information and synchronizing radar trigger pulses.

The PI-7100 Radar Recording System provides such a device. The system consists of two units: a PI-7100 broadband video recorder and Radar Interface Coupler. It is now possible to record complete 2D radar information including single-speed synchro information and a composite video signal composed of radar video mixed with trigger signal from the radar. Pulses with a rise time of .25 ms may be recorded, providing an equivalent radar video bandwidth of 4.0 Mc. Upon playback, the interface equipment extracts synch pulses from the composite video, provides trigger signals for the PPI and provides synchro position information for the PPI azimuth servos. Total recording time is 1½ hours per 10½ inch reel of tape.

For further information Ref. Art. #5



The new PI-6810 Airborne Recorder

NEW LINE OF AIRBORNE RECORDERS BEGUN

Drawing on engineering techniques acquired in the development of PI-6100 and PI-6200 Portable Instrumentation Tape Recorders, Precision Instrument has just developed the PI-6810, first of a line of compact,

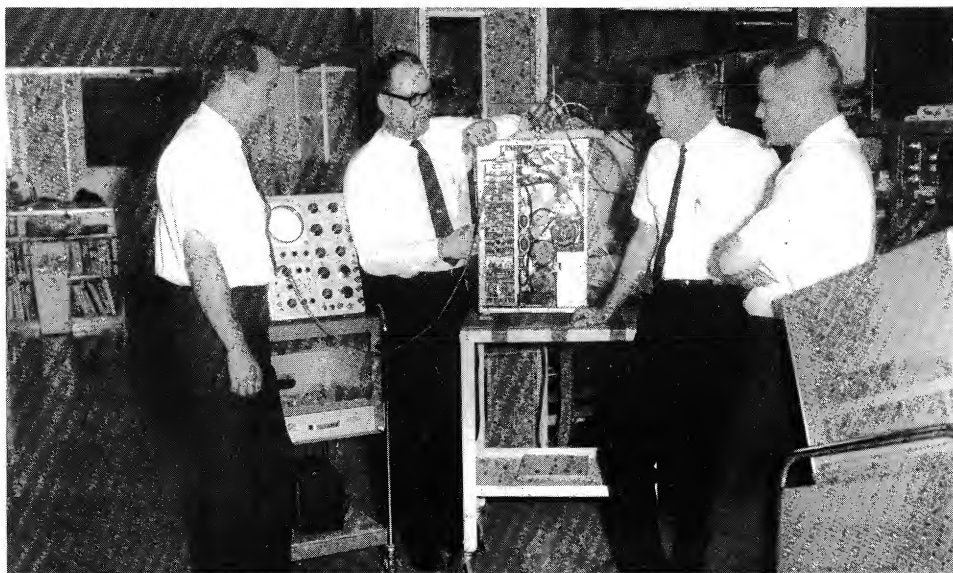
shock-mounted, modular units for aircraft use. The machine features high vibration resistance, electronic noise shielding, slide-in modulator electronics up to 8 channels, 3 speeds and fully transistorized circuitry.

For further information Ref. Art. #6

Expanded PI Service Program Puts The Know-How Where The Recorders Are

With all due respect to the old slogan "Service is as close as your phone," how do you handle customers like John Wagner and Jan Seren of Stanford Radio Science Lab presently in Antarctica with several PI-200's ... or

how about Charles Cardwell and Al Selves of Raytheon with a PI-6200 in the Arabian desert? Despite the fact that these men will be isolated for more than a year, we're not worried, because they're not worried. These



Customer Service Engineer Byron Carr gives tips on servicing PI-7100 Recorder

fellows are all recent graduates of PI's Technical Training School—one of the vital ingredients of a new, expanded Customer Service Department.

Heading up our Product Training is Byron Carr, Customer Service Engineer. Byron has developed product training programs for the various product lines with the needs of the service engineer in mind. PRACTICALNESS is the emphasis; and in the training program each student has many opportunities to handle and use the equipment.

Following a concentrated series of lessons explaining in simple language the principles of operation of the recorder, the student becomes involved in operation and alignment of the recorder coupled with troubleshooting techniques.

To some who attend the training programs, this is their first experience with tape recorders, while others may have used recorders extensively. Each course is geared to the abilities and needs of those attending through personalized instruction,

thus assuring that each student understands tape recording fundamentals and principles used in providing the capabilities of the particular recorder he is studying. The combination of theory and practical experience on the equipment, using the product manual and other information given in class enable the trainee to be completely familiar with the equipment and tools for service and maintenance.

The product training program is not limited to main product lines. Special programs covering modifications or special products are also developed on request from the product user. All that is necessary to join this program is a call to the local PI Regional Office. Arrangements are then made to gear the training program to the specific application required and a series of sessions is set up.

As additional support to Customer Service, each PI Regional Office is now staffed with at least one Field Service Engineer, highly qualified to handle customer maintenance re-

PRINT OUT

A CURRENT LISTING OF LITERATURE AVAILABLE FROM PRECISION INSTRUMENT COMPANY

Interface Equipment for Incremental Recorders by Edwin Y. Webb

—Ref. Article No. 8

Designing Input Circuits with Lowest Possible Noise by John J. Rado

—Ref. Article No. 9

Extending the Bandwidth of a Conventional Instrumentation Recording System by Al M. Wilson

—Ref. Article No. 10

The Application of Wow and Flutter Techniques to FM Magnetic Recording Systems by Robert Peshel

—Ref. Article No. 11

Data-gathering Tap Recorder (a system description) by Wilburn Rumble

—Ref. Article No. 12

PI-1200 Read/Write Incremental Digital Tape Recorder

—Ref. Article No. 13

PI-200 Magnetic Tape Recorder

—Ref. Article No. 14

PI-2100 Magnetic Tape Recorder

—Ref. Article No. 15

PI-5100 Monitoring Tape Recorder

—Ref. Article No. 16

PI-400 Laboratory Tape Recorder

—Ref. Article No. 17

PI-6200 General Purpose Instrumentation Tape Recorder

—Ref. Article No. 18

PI-1167 Write Only Incremental Digital Tape Recorder

—Ref. Article No. 19

PI-1177 Portable Incremental Digital Tape Recorder —Ref. Article No. 20

PI-7100 Broadband Video Tape Recorder —Ref. Article No. 21

quirements. Dave Wills, Customer Service Manager, sees to it these engineers get the backing they need. Close contact is maintained with the field engineers in order to keep them continually advised of product changes and improvements. For jobs requiring precision works, Customer Service maintains facilities at the plant in Palo Alto to completely overhaul, update, modify, or service any of the PI product lines.

For further information Ref. Art. #7

WANTED

People interested in recording:

Applicants desired from industry, hospitals, schools, laboratories; with almost any type of data acquisition problem. Special benefits available for people who once thought magnetic tape recording was too expensive or complicated.

Successful applicants need only know how to pick up data and turn simple knobs. Need own source of power (110 volts; or 220; 48 to 400 cycles; or 12 volts DC). Will be allowed to operate in plant or lab, and have complete freedom to record in the field, in car, aircraft, submarine, or Land Rover.

Can have any number from 1 to 8 data channels on a quarter inch of tape; will not be required to buy any more channels than needed. Will be able to change from Direct to FM recording, select one of three recording speeds in unique and highly useful speed ratios of 1:10:100 . . . all at the flip of a switch without changing electronic modules. Must be prepared to record and play back in both directions, and be able to compress a whole night's operations into a 10-minute playback next morning, or expand a critical 3-minute event into 5 hours of detailed analysis.

VELOCITY
TEMPERATURE
WEIGHT
VIBRATION
FREQUENCY
PRESSURE
FLOW
R. P. M.
ACCELERATION
BRAINWAVES
TIME INTERVAL
DISTANCE
PULSEBEATS
HUMIDITY
pH
POWER
TIDES
SOUNDS
MOTION
SALINITY
FILM THICKNESS
LIGHT INTENSITY
VISCOSITY
EARTHQUAKES
You name it!

All usual fringe benefits available, plus significant advantage in dealing with largest, oldest exclusive manufacturer of instrumentation tape recorders; designer of first solid-state recorder (1958), first portable instrumentation recorder (1958), first concentric reel recorder (1958), first satellite recorder (1960), first portable television recorder (1962), first incremental recorder (1962).

Send only name and present affiliation; PI-6200 brochure containing complete specifications will be mailed immediately.

Contact PI-6200 Application Dept., 3170 Porter Drive Stanford Industrial Park, Palo Alto, California 94304 or call nearest representative for local interview.

We're world wide.

**PRECISION
INSTRUMENT**



PI-6200 is an equal opportunity recorder, available to anyone regardless of sex, race, color, creed, or national origin.

No engineering degree required!



PI-6200 magnetic tape recorder, easiest-to-use tape recorder ever designed; will help applicant fill any data acquisition job requirements.

For further information Ref. Art. #22